

Tendon Strain Apparatus

A Non-Contacting Solution for Strain Analysis of Soft Tissue

PROBLEM STATEMENT

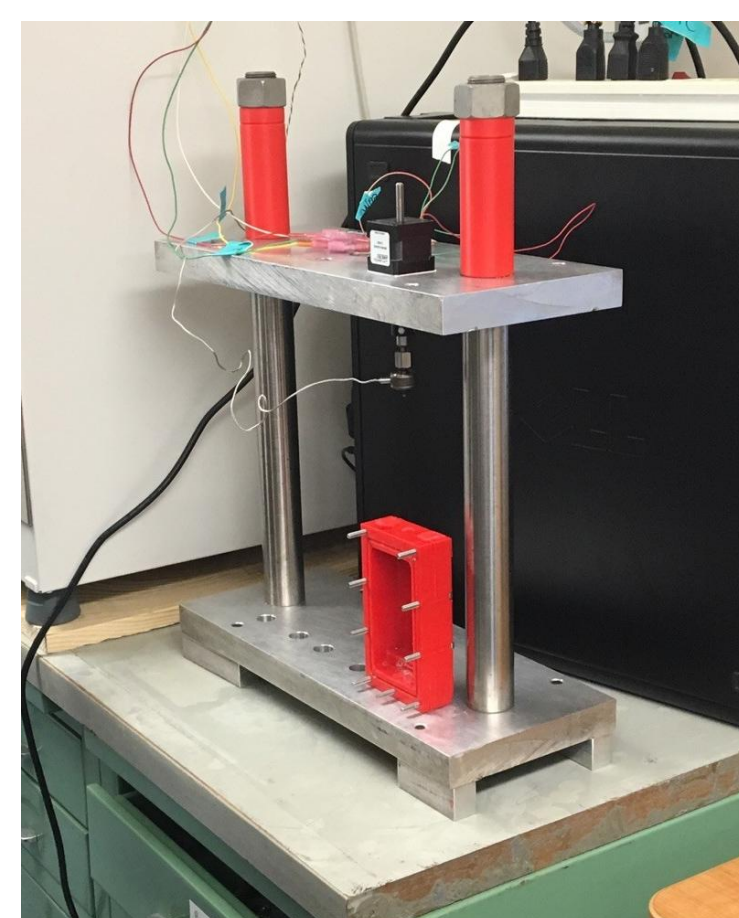
Tendons are soft collagenous tissues that transfer forces between muscle and bone. They have poor healing ability and overuse injuries are common. To help the development of preventative therapy techniques and regeneration of tendon injuries, a better understanding how mechanical forces influence tendon behavior is needed.

Our client has a mechanical bioreactor that is used to test the mechanical properties of engineered tendon constructs and tendon tissues in his lab. His system is able to measure tensile force applied and displacement between the grips holding the tissue.

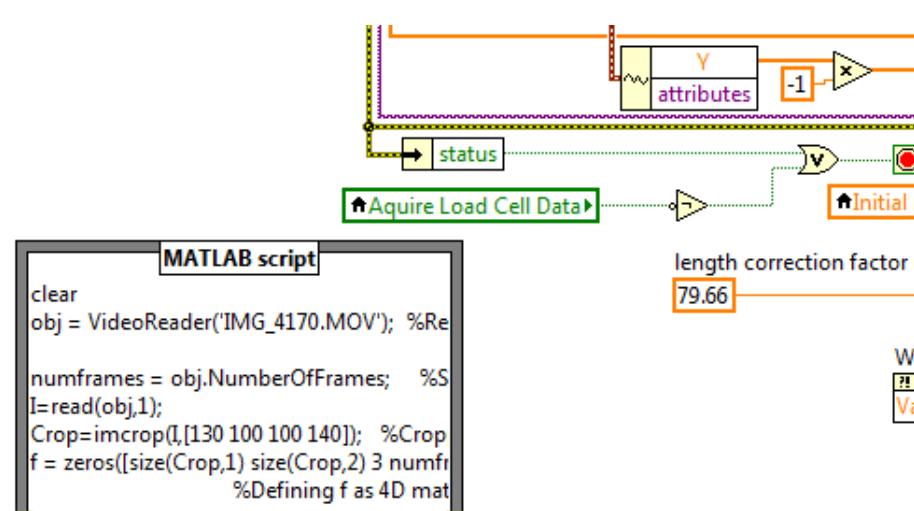
OUR GOAL

Our objective is to design and develop a non-contacting video system to measure the strain within soft biologic tissues.

PROJECT LEARNING



- Incorporating Client's developed system
- Learning Vision Acquisition software in LabVIEW
- Ruling out MATLAB
- Troubleshooting lenses for distortion
- Adapting to setbacks
- Program version compatibility issues



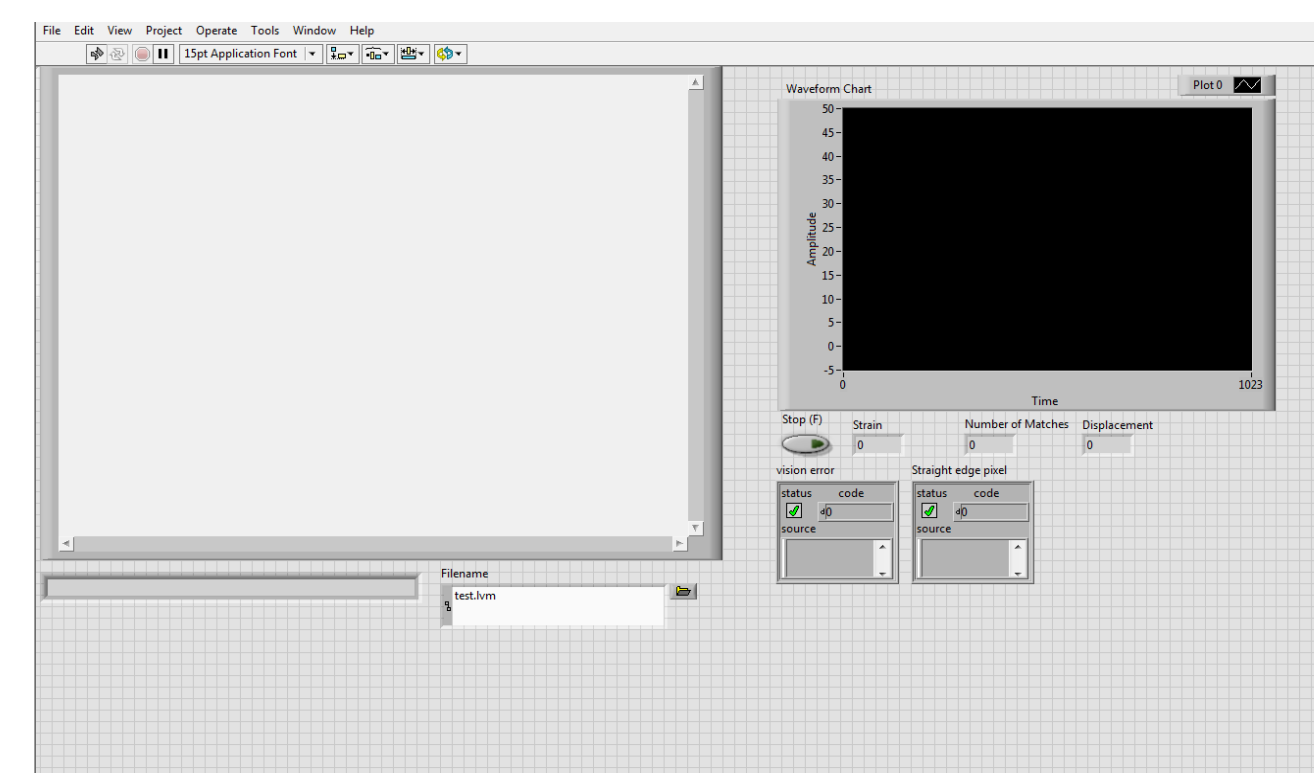
THE DEV-ELOPERS

Kelie Gonzalez (BE), Gretchen Gingerich (BE),
Craig Tedmon (ME), Benjamin Perley (ME)

Dr. Nathan Schiele – Client
Dr. Dev Shrestha – Lead Instructor

OUR PROJECT

Our non-contact video system displays the live video feed in the left window (shown below in white) while simultaneously measuring the displacement of two points on a collagen sponge. This displacement is then calculated and graphed in the window to the right of the video feed (shown below in black).



Shown above is the assembled camera system in our client's lab, hooked up to his bioreactor and the computer.

PHYSICAL FEATURES

Camera:

- THORLABS Compact DCC1645C
- Pixel size: 5.2μm
- Resolution: 1280x1024 pixels
- Compact size



Mounting:

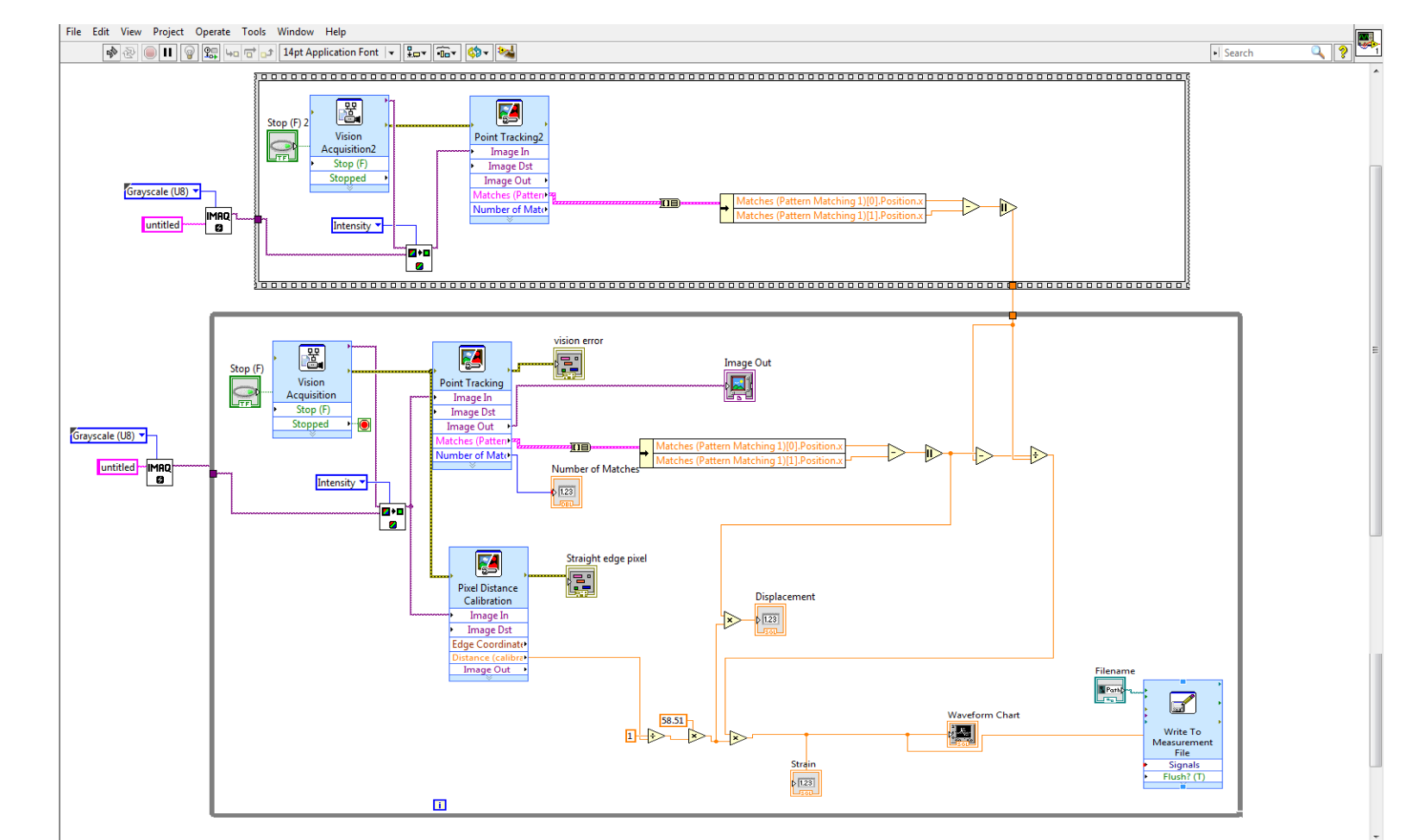
- Tether Tools 7" articulating arm
- One knob release for adjustments
- Two articulating joints

Lens:

- 8mm focal length
- Manual Focus
- Compact size
- CS mount

LABVIEW SYSTEM

Below is an screen capture of our block diagram for our developed coding system in LabVIEW.



PROJECT COST

Camera	\$365
Presentation Materials	\$132
Articulating Arm	\$96
MATLAB Data Acquisition Software	\$87
Lens	\$85
Total	\$765
Remaining Budget	\$735